



# Hamburger Bun Analysis

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Hamburger buns and rolls are a major category in American baking because they serve the Quick Service Restaurant (QSR) and food service industries. Hamburger consumption surges during the summer months due to cookouts and road trips. These days, buns and rolls must also compete against perceived healthier options with higher fiber, lower carbohydrate counts, and cleaner labels. These variables have recently produced an unpredictable environment for bun manufacturers. Here's what is affecting the hamburger bun market:

- QSR chains are moving away from emulsifiers like SSL and DATEM to cleaner label solutions
  - A shortage of ingredients like gluten, emulsifiers, and starches has prompted many bakeries to seek better flour and clean-label solutions
  - A demand for healthier versions of hamburger buns like sourdough and keto
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# Hamburger Bun Production

Bun producers are now more focused on targeting premium-type hamburger buns made of whole-grain dough and indulgent ingredients like butter and eggs. Being creative but also offering cost-effective alternatives has become a priority now. Finally, this market must ensure a clean label and cost-affordable hamburger bun.<sup>1</sup>

Hamburger buns are soft, round, and sliced rolls with an average weight of 70.9g or 2.5 oz. Depending on the customer and fast food chain, hamburger buns may have a diameter range of 7.6 cm (3 in) to 11.4 cm (4.5 in) and an average height of 5cm or 2 in.<sup>1</sup>

Hamburger bun production is a straightforward process that is easily accomplished on a high output line. Depending on the customer or QSR chain, the type of sandwich build, shelf-life expectations, and market trend, formulations may highly vary.

## Key Elements in Flour Quality

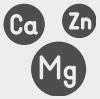
Flour is the biggest ingredient in hamburger bun production. Therefore, its following properties are important:



### Moisture

Moisture content is critical for maintaining the softness and freshness of hamburger buns. Ideal moisture levels help ensure that the buns remain fluffy and do not dry out during storage. Excess moisture can lead to spoilage and microbial growth, while insufficient moisture can result in a hard, stale texture. Maintaining an optimal moisture balance is essential for achieving the desired sensory qualities in the final product.

*Identifying the key elements that affect the final quality of your hamburger buns is essential for implementing effective quality control. Let CHOPIN Technologies instruments from KPM Analytics analyze and understand your flour and dough. [Learn more about flour quality tools!](#)*



## Ash

Ash in the flour used for hamburger buns is the mineral content, primarily derived from wheat bran. It affects the flavor, color, and nutritional profile of the buns. High ash content can contribute to a darker crust, a greyish crumb, and a more complex flavor. However excessive ash may also lead to undesirable bitterness with a negative effect on volume. Therefore, controlling ash levels is important to ensure that the buns meet quality standards and consumer preferences.



## Protein

Protein plays a vital role in the structure and texture of hamburger buns. A higher protein content of around 12-14%, particularly from wheat gluten, contributes to better dough elasticity and gas retention during fermentation, resulting in a lighter and fluffier bun. However, too much protein can lead to a tough texture, so achieving a balance is key. The ideal protein content provides the bun's resiliency and enhances the sandwich build.



## Water Absorption Capacity (WAC)

Water absorption capacity is crucial for dough handling and the final texture of the buns. Low water absorption can cause the dough to be dry, with limited flow in the pan. Too much water extends mixing time and can cause the dough to be too sticky, making it difficult to handle. Ideally for hamburger buns, the required hydration level is around 60-65%. Rheological tests should be performed to understand where is the topical water absorption level. This property is particularly important during mixing and fermentation, as it affects the dough's consistency and the final product's moisture retention.



## Damaged Starch

Damaged starch refers to starch granules that have been broken down during milling or processing. This property can enhance water absorption and improve the texture of the buns. Damaged starch influences water absorption, high levels of damaged starch generate a higher water absorption from the dough, thus influencing dough plasticity and consistency, thus contributing to a softer crumb and preventing the buns from becoming too dense. It is particularly beneficial in formulations that require a fine crumb structure, as it helps achieve the desired mouthfeel. Analyzing starch is a vital step in selecting the ideal flour, instruments like the SDmatic can aid in the quick and accurate evaluation of this parameter.



## Enzymatic Damage

Enzymatic damage occurs when enzymes break down proteins and starches in the dough, which can negatively impact the texture and stability of the buns. Managing enzymatic activity is crucial during production to prevent undesirable changes, such as loss of dough strength or excessive fermentation. Proper control of enzymatic processes ensures that the buns maintain their structural integrity and do not develop off-flavors or textures. The falling number is a standardized method used to measure the activity of alpha-amylase in grains and flour, this number is used as a reference to determine the appropriate flour blend for specific baking applications according to the desired enzyme activity.



*These recommended levels serve as a starting point for crafting a conventional hamburger bun. However, they aren't rigid guidelines—every recipe and processing condition is unique, so feel free to adjust and fine-tune the formulation to meet your specific needs and preferences.*

# Rheological and Functional Analysis

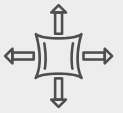
Rheological measurements are associated with the behavior of the dough during processing. Understanding rheological parameters allows bakers to choose the right flour for their intended purpose.

Most common rheological and functional parameters:



## Consistency

Consistency is a measurement of the hardness or firmness of the dough, it characterizes the overall dough texture. This parameter is highly influenced by the water absorption capacity of the flour, it has constant changes during mixing due to gluten development.



## Extensibility

Extensibility is the dough's capacity to be stretched without tearing. The protein network highly influences this property, and it shows the capacity of the dough to hold the desired shape.



## Elasticity

Elasticity is the property of the dough that tends to return to its original shape when stretched. It is an important processing parameter, given that it determines the machinability of the dough.



## Retrogradation

This is the phenomenon of starch crystallization that occurs after baking. This causes the stiffness of the crumb and thus influences the final product staling process.



## Volume

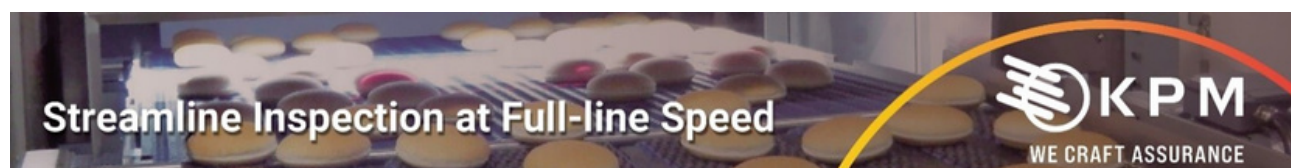
Volume is the space occupied by the bun and its influence by the dough's capacity to retain carbon dioxide from yeast fermentation, this is highly associated with the development of the gluten network. However, the volume also depends on two other important factors. Firstly, the ability to produce enough gas (e.g. carbon dioxide), which is impacted by yeast quality and by the amount of free sugars available for yeast fermentation. Secondly, the overall flour profile regarding the content of damaged starch, and amylase activity. This parameter is primordial for overall hamburger bun quality and its complexities can be well characterized by the Rheo F4.

Several analytical tools are available in the market to objectively quantify the rheological and functional parameters mentioned above. Among the most known and used are Alveograph, Mixolab 2, and Rheo F4.

## Vision Analysis

Final product quality depends on a variety of factors from flour, to processing passing through formulation. Once the final product is produced it must undergo further quality analysis to guarantee consumer acceptance, and thus this is where Vision Analysis comes into play.

In modern hamburger bun production, advanced vision inspection systems play a crucial role in ensuring product quality and consistency. These systems use high-resolution cameras and sophisticated image-processing software to detect defects, measure product dimensions, and ensure uniformity in shape, size, and color. By scanning each bun as it moves along the production line, vision inspection systems can identify imperfections such as uneven baking or surface blemishes. This real-time quality control allows for immediate corrective actions, reducing waste and improving overall efficiency. Additionally, data collected from vision inspection systems can be analyzed to identify trends and areas for process improvement.



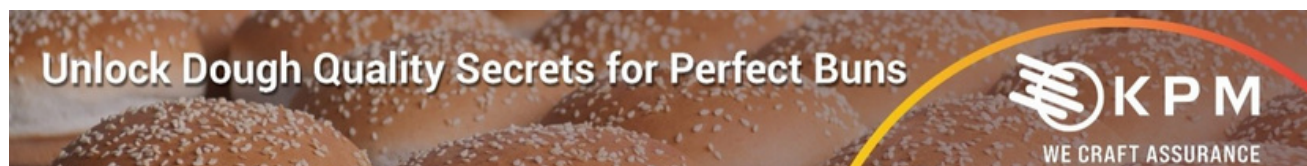
Parameter measure by Vision Analysis Systems:

- 2D/ Shape and Size: diameter, roundness, length, and width.
- 3D/Height: peak height, 3D profile, slope, and surface texture.
- Color: bake color from top and bottom.
- Topping/Seeding: coverage, distribution, and voids of sesame seeds.

This system allows for automatic defect detection, thus reducing overall processing times while keeping the highest quality control for consumer satisfaction.

## Summary of Hamburger Bun Quality Analysis Tools

Quality Category	Quality Parameter	Measuring Instrument
<b>Moisture and Compositional Analysis</b>	Moisture	NIR
	Protein	
	Ash	
	Water absorption	Mixolab 2 Alveolab
	Damaged starch	SDmatic 2



Quality Category	Quality Parameter	Measuring Instrument
<b>Rheological and Functional Analysis</b>	Consistency	Mixolab 2
	Extensibility	Alveolab
	Elasticity	Alveolab
	Volume	Rheo F4 and Mixolab 2
	Retrogradation	Mixolab 2 SDmatic 2
<b>Vision Analysis</b>	2D/ Shape and Size	Vision Inspection imaging technology
	3D/Height	
	Color	
	Defects/out-of-spec	

Discover how **KPM Analytics'** vision inspection systems help bakers maintain high standards and meet customer expectations consistently. [Learn more!](#)



# Summary

Measuring the quality of hamburger buns, just as with other baked goods is not a straight shot. Choosing the right ingredients and processing parameters highly depends on the desired final product. Bakers need to understand each processing step and how it affects the final product, choosing the right ingredients is just the beginning of the selection journey confronted by today's bakeries to satisfy consumers' demands.

A wide variety of tools are available today to guarantee the optimum selection of raw materials and processing parameters, as well as to guarantee the final product selection to satisfy consumers' needs.

## References

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